Morning Agenda

1. **Warm-up:** SI activities
2. **Early Reading**

BREAK

3. **Emergent Reading / Decoding**

BREAK

4. **Comprehension**

BREAK

5. **Technology and literacy**

LUNCH

Getting to Know Each Other

- A little about me.
- A little about you.

1. Warm-Up

- NCSC Wiki and the IR Guide
- Partner practice: Constant time delay
- Partner practice: System of least prompts

The Apple Analogy

- We need to emphasize **practices and skills** (as opposed to only content knowledge)
- We need to emphasize the "**big ideas**" (cross-cutting concepts from the NGSS; big ideas in math that connect multiple domains)

Make Standards Accessible

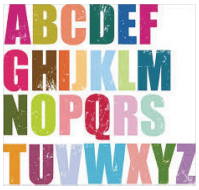
- Prioritize
  - Teach a portion of the standards
- Pinpoint
  - Teach a portion of each standard
- Simplify
  - An extension of the standards
- Task Analyze
  - Skill sequences

- For the standard you selected
  - Would you teach this standard?
  - Would you teach all of it or some of it?
  - Does it need to be simplified? How?
  - Are there skills to teach before/ after this? What?

Extending Grade Level Standards:
Common Core Example - ELA

Strand: Category of standard	Grade level standard	Objectives based on present level of performance
Reading: Literature **Integration of Knowledge and Ideas**	**4th Grade** Compare and contrast the treatment of similar **themes** and topics (e.g., opposition of good and evil) and patterns of events (e.g., the quest) in stories, myths, and traditional literature from different cultures.	**High Level of Supports** Leslie will select an object/picture to represent a story's **theme** for 4 of 5 opportunities. **Moderate Level of Supports** Adam will use pictures to identify **themes** in literature that has been read to him and sort the different stories by corresponding themes for 4 of 5 opportunities. **Low Level of Supports** Thomas will use a Venn diagram to compare and contrast the **themes** of literature he has previously read with 90% of responses correct for at least 3 stories.

2. Early Reading

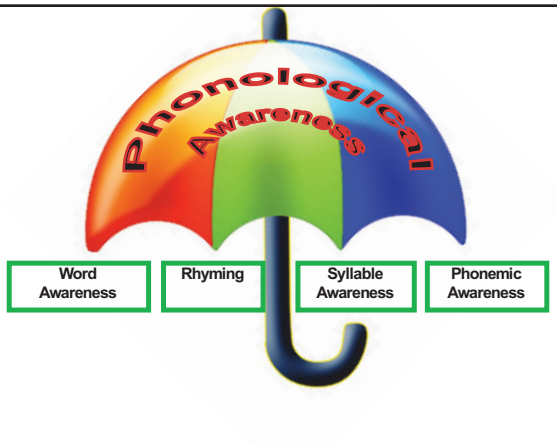


How to teach Early Literacy

1. Understand phonological awareness
2. Decide on a developmental sequence of letter-sounds to introduce

e.g., a m t s l f d r o g l h u c b n k v e w j p y T L M F D I N A R E H G B x q z J Q

3. Select several skills to teach multiple components (stretching sounds, IDing sounds, text awareness, rhyming)
4. Use time delay
5. Plan for generalization



Let's Watch

Attainment's

ELSB

Lesson 1

Let's Discuss

- Turn-and-talk
- What did you see?
- What are you wondering?

Early Literacy Skills Builder (ELSB)

An ELA curriculum with eight progressive levels of reading skill development

Strategies Include Instruction In:

- Phonemic Awareness
- Phonics
- Sight Word
- Vocabulary Development
- Fluency
- Comprehension
- Listening
- Writing

ELSB

Objectives/Activities

- Flashcard Game
  - ✓Objective 1- Student reads vocabulary words
  - ✓Objective 2- Student identifies/points to words to complete sentences
- Text Pointing
  - ✓Objective 3- Student points to text as teacher reads
- Hidden Word Game
  - ✓Objective 4- Student points to word that completes a storyline

ELSB

Objectives/Activities

- Answering Questions
  - ✓Objective 5- Students respond to literal/inferential questions
- Chunking Words
  - ✓Objective 6- Students demonstrate understanding of syllable segmentation by clapping out syllables in words
- Tapping Out Sounds
  - ✓Objective 7- Students demonstrate understanding of phoneme segmentation by tapping out sounds in CVC words

ELSB

Objectives/Activities

- Letter Sounds Game
  - ✓Objective 8- Students identify letter-sound correspondences
- First/Last Sounds Game
  - ✓Objective 9- Students point to/say first/last sounds in words
- Finding Pictures with Special Sounds
  - ✓Objective 10- Students identify pictures that begin/end with named sounds

ELSB

Objectives/Activities

- Stretching Words
  - ✓Objective 11- Students point to sounds in words
- Finding Pictures
  - ✓Objective 12- Students blend sounds to identify pictures
- The New Word Game
  - ✓Objective 13- Students point to pictures/words representing new vocabulary
- Fun with Writing
  - ✓Objective 14- Students use new vocabulary and personal information to create a book titled, "My Book About Me"

Promote Generalization


cat


cat


cat

How to teach Early Literacy

1. Understand phonological awareness
2. Decide on a developmental sequence of letter-sounds to introduce

e.g., a m t s l f d r o g l h u c b n k v e w j p y T L M F D I N A R E H G B x q z J Q

3. Select several skills to teach multiple components (stretching sounds, IDing sounds, text awareness, rhyming)
4. Use time delay
5. Plan for generalization

- Phonological awareness
- Constant time delay
- Promote generalization
- Anything else?

3 min

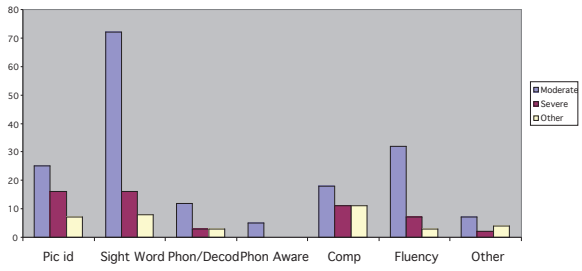
3. Emergent Reading / Decoding

Phonemic Awareness and Phonics

Let's Discuss

- Turn-and-talk
- What did you see?
- What are you wondering?

Where is the phonics?



Browder, D. Wakeman, S., Spooner, F., Ahlgrim-Delzell, L., & Algozzine, R.F. (2006). A comprehensive review of reading for students with significant cognitive disabilities. *Exceptional Children, 72*, 392-408.

So what's going on?

✓ We know students CAN learn phonics.
✓ We know it's the LAW to provide research and evidence-based reading instruction to all students.

What are the barriers?

Limitations We Needed to Address:

- Most prior research on phonics assumed speech capability
- Research with students who use AAC used internal processing for skills like blending
- In the ELSB, students graduated from the curriculum. Some responded well to programs like Direct Instruction (using what speech they had). Others needed an option with less reliance on speech, more visual cues, and skills presented in smaller chunks.

Attainment Company, Inc.

GoTalk PHONICS

Early Reading Skills Builder

An Emergent Reading Curriculum
iPad App

Curriculum Overview

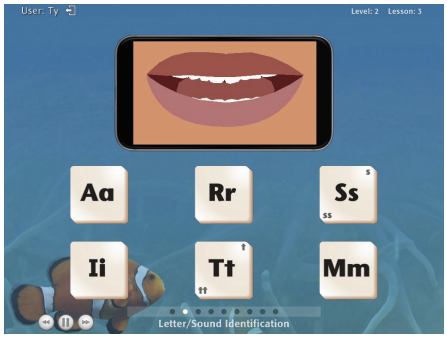
- **LEVELS**
  - There are 26 levels covering all primary phonemes
- **LESSONS**
  - There are 5 lessons in each level
- **SKILLS**
  1. Letter sound identification
  2. First sound in words
  3. Segmenting words
  4. Blending sounds to form words
  5. Blending sounds to form words 2 (Picture matching)
  6. Sight words
  7. Reading text and Comprehension

Time Delay

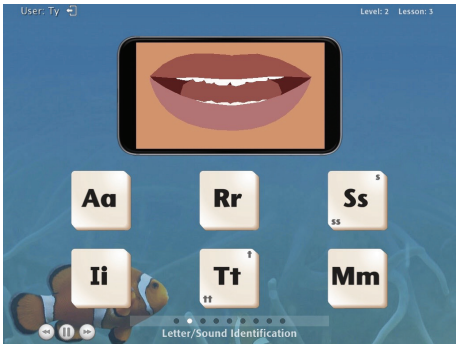
- GoTalk Phonics (ERSB) Time Delay
  - Lesson 1: 0 seconds
  - Lesson 2-5: 4 seconds
- Error Correction
  - If accuracy < 50%, drop back to 0-s delay level for next session

Time Delay

Lesson 1: 0-second Delay



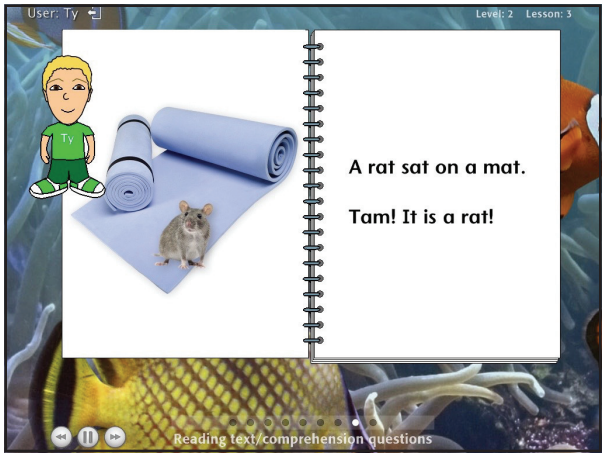
Time Delay
Lesson 2-5: 4-second delay

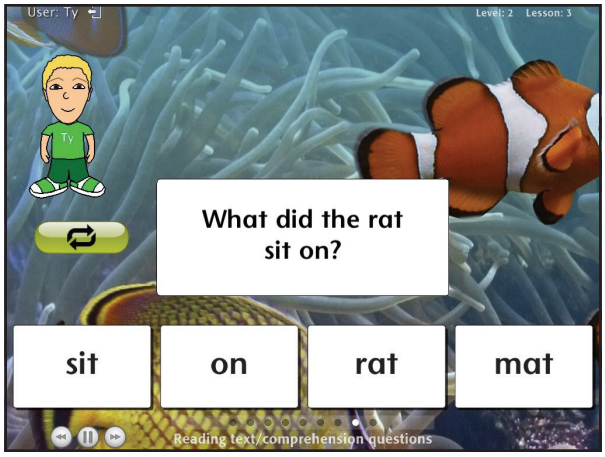


System of Least Prompts

- Gives the student the opportunity to perform the task with the least amount of assistance before gradually increasing the type of prompt.
- In GoTalk Phonics (ERSB), we use the system of least prompts for answering comprehension questions about the text from the book.
- If the student makes an error at any time in the process, immediately model the correct answer, have the student press the correct response, and end the trial.

Ask Question	1st Prompt (Verbal): Tell student to reread using iPad; repeat question	2nd Prompt (Verbal): Reread target text to student; repeat question	3rd Prompt: (Model/ Gesture) Press correct answer on iPad; continue pointing until student presses it





Fading

A procedure for the teacher to decrease the type and amount of support while maintaining the skills the student has learned.

Fading occurs during Blending Sounds 2 and Reading Text and Comprehension

Why fading?

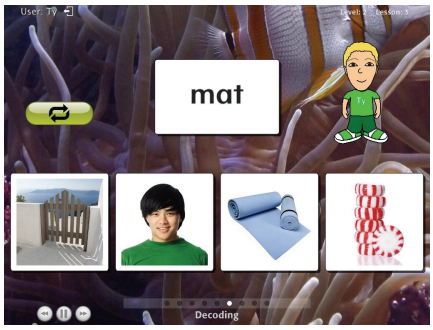
–Goal of the ERSB is to teach students to silently read text and comprehend what they have read

Fading

- ERSB Phonics fading sequence
  - Read full voice
  - Whisper read
  - Point only
  - No prompt, student reads silently

Fading Practice

- Read full voice
- Whisper read
- Point only
- No prompt



Fading Practice

Tom is a man. Tom is fit.

Sam! Toss it in! Not at the ram!

- Read full voice
- Whisper read
- Point only
- No prompt

Let's Practice

- Let's start with /m/, /s/, /a/
- Make sound cards using index cards
- Partner Practice: Teach sound identification using the cards (Constant Time Delay)
- What target words could you use for first sound identification?
- What sight words might you need to teach?
- What is one or two sentences of decodable text you could teach?
- What is one comprehension question you could ask about the text you developed?

How to teach Phonics

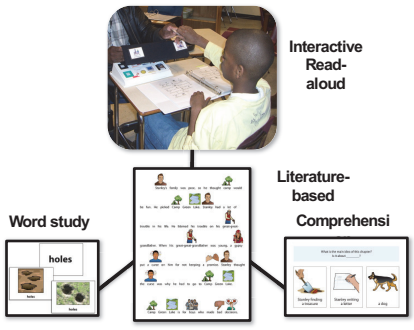
1. Decide if students need a high tech device for vocal output (GoTalk NOW app will work, GoTalk 32 will work)
2. Decide on a sequence of letter-sounds (teach 3 at a time)
3. Select skills to teach every lesson
4. Change targets every lesson
5. End lessons with decodable text
6. Fade supports over time ("read in your head")

- Very little prior research on phonics
- ALL students can learn phonics, including students with communication support needs
- We can teach phonics with systematic, explicit instruction and technology
- Teachers are using it and it's WORKING
- What else?

4. Comprehension

a) Story-Based Lessons (SBL)
b) Modified System of Least Prompts
c) Graphic Organizers

Standards-Based ELA Lesson



Browder (2015)

Let's Discuss

- Turn-and-talk
- What did you see?
- What are you wondering?

a) Summary of Findings from SBL Studies

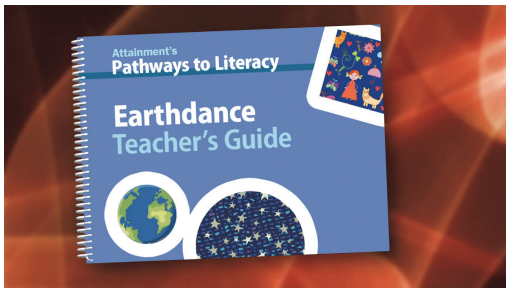
1. Use of grade-aligned texts
2. Use of literary and expository texts
3. Use of peers
4. Use of systematic instruction (e.g., system of least prompts)

a) Steps of SBL Task Analysis

Teacher will:	Student will:
1. Gain student attention	Interact with materials
2. Ask for prediction	Indicate a prediction
3. Read title	Point to title
4. Read author's name	Point to author
5. Ask: "How do we get started?"	Open book to first page

Teacher will:	Student will:
6. Read text and provide chances to turn pages	Turn pages when appropriate
7. Pause for repeated storyline	Anticipate or finish repeated storyline
8. Pause for finding vocabulary words/symbols on page	Point to requested word/symbol
9. Ask student to point to line of text	Text point/eye gaze chosen line
10. Ask comprehension question/review prediction	Answer questions

Let's Watch



Let's Discuss

- Turn-and-talk
- What did you see?
- What are you wondering?

b) Modified System of Least Prompts

- Teaches students how to use supports
- Key features:
  - Hierarchy of 3-4 prompt levels
  - Moves from least to most amount of assistance until student can perform behavior independently

Prompting Hierarchy
Natural Cue
*Non-specific verbal
Large portion of text containing answer
Smaller portion of text containing answer
State the answer from text

b) Modified System of Least Prompts

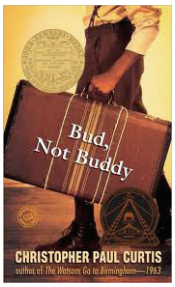
For example:

Prompting	Response
Directional cue	Teacher says, "Who is the main character in our story?"
(if no response) First Prompt	Teacher rereads portion of text containing information about the character
(if no response) Second Prompt	Teacher rereads a sentence or phrase with the characters name
(if no response) Third Prompt	Teacher states the character's name and points to a picture symbol

b) Constructing M-SLP

- Determine levels needed for the student and task
- Goal is to provide **least** amount of assistance necessary
- Prompting should teach students how to increase independent correct responding or reduce prompt intensity
- Once prompting hierarchy is established, be consistent!

Adapting Books for Emergent Readers



Chapter 4

Bud sleeps outside another night. Late that night, his friend finds him. His friend's name is Bug. Bud is happy to see Bug. The boys want to leave the town. They want to ride a train. They wait for the train with other people. Bud meets a girl. She is nice. Then the train comes. Bug runs fast. He gets on the train. Bud runs slow. He misses the train.

Handouts 5

Let's Practice

Example of SLP

Chapter 4

Bud sleeps outside another night.
Late that night, his friend finds him.
His friend's name is Bug. Bud is happy to see Bug. The boys want to leave the town. They want to ride a train.
They wait for the train with other people. Bud meets a girl. She is nice.
Then the train comes. Bug runs fast.
He gets on the train. Bud runs slow.
He misses the train.

Prompt	Response
Natural cue	Teacher says, "Who is the main character in our story?"
[if no response] Verbal	Teacher says, "I heard the answer in the text" and rereads portion [~ 3 sentences] of text containing information that answers the question. Teacher repeats question.
[if no response] Verbal	Teacher says, "I heard the answer in the text" and rereads the sentence or phrase of text containing information that answers the question. Teacher repeats question.
[if no response] Model	Teacher states the correct response and asks the student to repeat the correct response.

Practice with a partner:

Why is Bud happy?

Who is nice?

Where does Bud sleep?

Adapting Books for Emergent Readers

1. Summarizing Content	• Reduce chapters to 1-3 pages in length • Summarize key concepts, include main idea statement, key events, characters, and setting • Upload content to Lexile Analyzer (www.lexile.com) to match the approximate listening or reading comprehension level

Handouts 6

Adapting Books for Emergent Readers

2. Construction of Book	• If student does not have visual impairment, retain the size and format of a typical chapter book (e.g., 12 point font, small size pages) • Can print pages on heavy card stock or laminate • Use picture symbols only with key vocabulary and only as needed (or not at all)

Adapting Books for Emergent Readers

3. Response Options	• Add a page of key vocabulary, or create a set of vocabulary flash cards (with or without picture symbols, photographs, or objects) • Create comprehension questions • Vary the number of response options to meet the needs of the students (may not need any response options)

Categories of Questions

- *Literal*: answer directly from text
- *Inferential*: answer requires background knowledge and text
- *Applied*: answer requires student to evaluate or make judgment about the text

Vacca, Vacca, Gove, Burkey, Lenhart, & McKeon (2012)

Question Formats

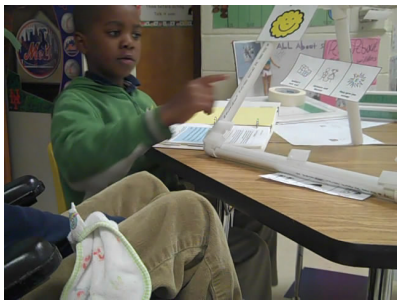
- Students who can generate answers (e.g., speak or type out response on AAC)
  - Ask the question and let student give you the answer
- Students who need options (e.g., select pictures/words on AAC)
  - Use multiple choice
  - May use 4 choice array
  - May use response board with more options for each story

Use Text-Dependent Questions

- Text dependent questions
  - Who was at the window?
  - What happened first?
  - What was the name of the street where Agnes lived?
- Not text dependent
  - Is a goat an animal?
  - Which of these is a name- Agnes, goat, chair, book

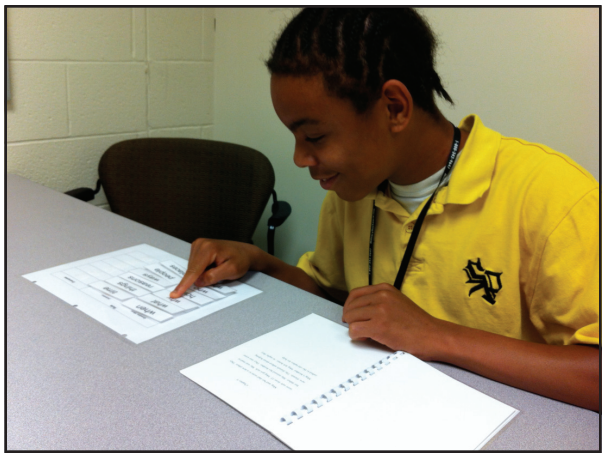
9-Option Response Boards Organized by Wh- Word

Modified Response Board



Teaching WH Definitions

Rule		Examples
Question Word	*Definition*	
who	people	
where	places	
what	things	
when	time	
how	ways	
why	reasons	



Self-Questioning Graphic Organizer

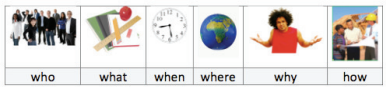
Name: _____ Date: _____

1. Think about the words in the heading:

Heading:

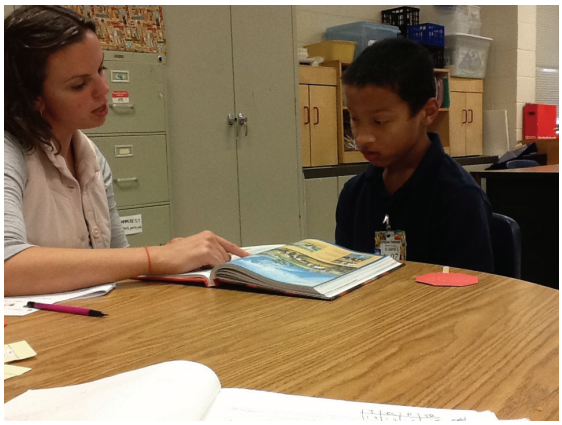
_____

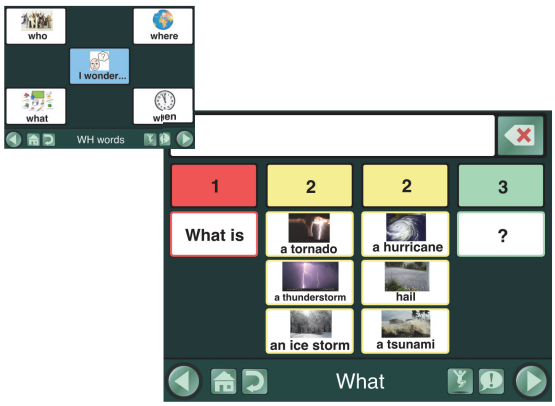
2. Pick ONE question word and ask about the heading:



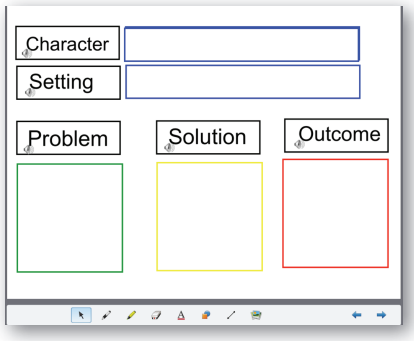
who	what	when	where	why	how

3. Record your question:



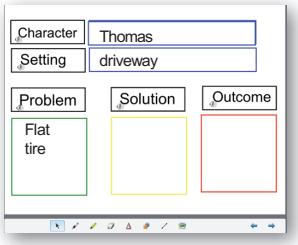


Wood, Browder, & Spooner

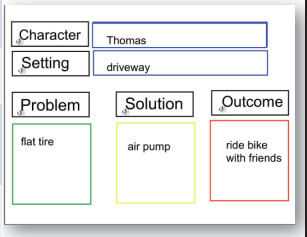


Browder, Root, Allison, & Wood (2014)

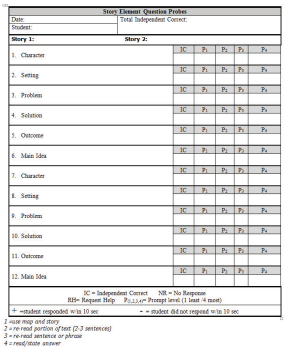
Prompting	Response
Natural cue	Teacher says, "Fill in the Solution from our story"
(if no / incorrect response) First prompt	Teacher prompts student to activate read aloud of the story element definition and reviews completed story map
(if no / incorrect response) Second prompt	Teacher re-reads portion of text (2-3 sentences) containing solution
(if no / incorrect response) Third prompt	Teacher re-reads a sentence or phrase containing solution
(if no / incorrect response) Fourth prompt	Teacher states the solution



Prompting	Response
Natural cue	Teacher says, "What caused trouble for Thomas?"
(if no / incorrect response) First prompt	Teacher prompts student to use story map and story for help
(if no / incorrect response) Second prompt	Teacher re-reads portion of text (2-3 sentences) containing the problem
(if no / incorrect response) Third prompt	Teacher re-reads a sentence or phrase containing the problem
(if no / incorrect response) Fourth prompt	Teacher states the problem



Data Collection



Story Element Question Probe

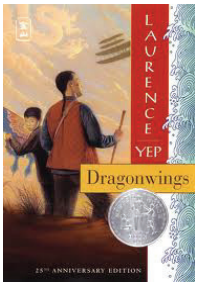
Date: Total Independent Correct:
Student:

Story 1:	Story 2:					
1. Character	IC	P1	P2	P3	Px	
2. Setting	IC	P1	P2	P3	Px	
3. Problem	IC	P1	P2	P3	Px	
4. Solution	IC	P1	P2	P3	Px	
5. Outcome	IC	P1	P2	P3	Px	
6. Main Idea	IC	P1	P2	P3	Px	
7. Character	IC	P1	P2	P3	Px	
8. Setting	IC	P1	P2	P3	Px	
9. Problem	IC	P1	P2	P3	Px	
10. Solution	IC	P1	P2	P3	Px	
11. Outcome	IC	P1	P2	P3	Px	
12. Main Idea	IC	P1	P2	P3	Px	

IC = Independent Correct NR = No Response
RH= Request Help $P_{(1,2,3,4)}$= Prompt level (1 least /4 most)
+ =student responded w/in 10 sec - = student did not respond w/in 10 sec

1 =use map and story
2 = re-read portion of text (2-3 sentences)
3 = re-read sentence or phrase
4 = read/state answer

Sample Lesson / Materials



Reflection

- **Turn-and-talk**: What were some big take aways from this section?
- **Self-reflection**: What ideas will I use in my classroom? What do I still need to learn or do in order to implement these ideas? What questions do I have?

- Story-Based Lessons
- Modified System of Least Prompts
- Adapting texts
- Asking questions
- Generating question
- Graphic organizers
- Anything else?

5 min

5. Technology to Promote Literacy

Barriers

- **Turn and Talk** – What are some barriers / problems / cautions for using technology in the classroom?

Evaluating Resources

Handouts 9

BridgingApps®

Bridging the gap between technology and people with disabilities

http://bridgingapps.org/

UDL Classrooms
Resources for Teaching via Universal Design for Learning

http://udlclassrooms.wordpress.com/educator-resources/multiple-means-of-representation/

General Apps

	SMART Notebook
	Kidspiration
	Educreations
GoTalk NOW	GoTalk NOW

Steps to Creating CCSS Literacy Lessons Utilizing Technology

1. Select Text
2. Consider Adaptation
3. Lesson Plan
   a) Vocabulary Instruction
   b) Presentation of Text
   c) Graphic Organizers
   d) Comprehension
   e) Writing Component

1. Select a Text

a) Middle of grade band in multi-grade classrooms
b) Easy to hard progression
c) Considerate of gender and diversity
d) Promote inclusive opportunities

1. Select a Text

- Activate students' **prior knowledge**
- Assist students to **visualize** as they read
- Help students **make connections** as they read

1. Select a Text:

★ Consider available supports

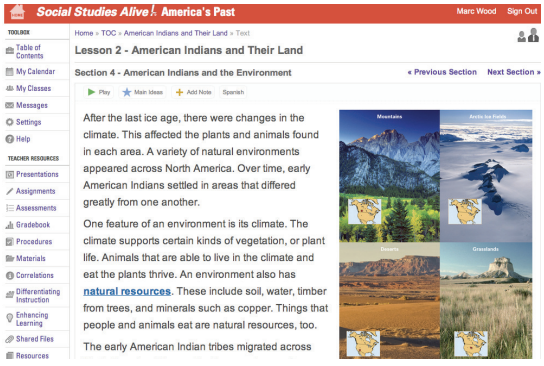
- YouTube
- TeacherTube
- BrainPOP
- Discovery Education / United Streaming
- Google Image
- Blachan.com/shahi

- Watchknowlearn.org
- Thinkfinity.org
- Flocabulary.com
- Studyjams.scholastic.com
- Virtual History Museum
- Thinking Reader - http://www.tomsnyder.com/products/product.asp?sku=THITHI

2. Adapt Text

Options for non-adapted text

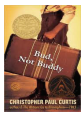
- Supported text
- Device accessibility features
- Supported text websites
  - Discoveryeducation.com
  - Barnes & Noble online story time
  - Project Gutenberg
  - Social Studies Alive!

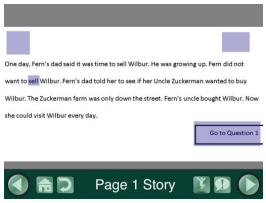


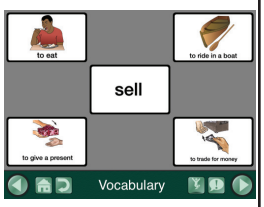
2. Adapt Text

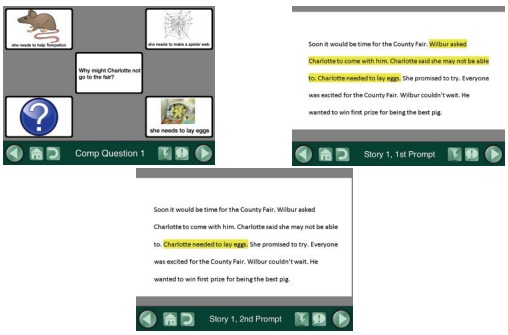
Technology options for adapted text

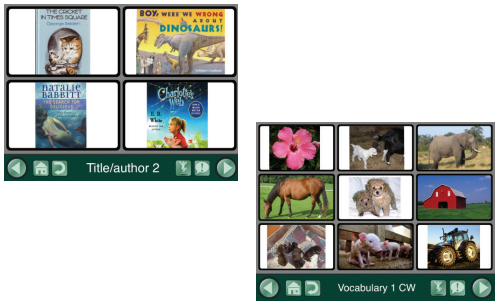
- CAST Book builder (bookbuilder.cast.org)
  - http://www.online-convert.com/
- PowerPoint
  - http://schools.nyc.gov/Offices/District75/Departments/Literacy/AdaptedBooks/default.htm
- SMARTboard app
- GoTalk NOW app











2. Adapt Text

★ "No more different than necessary"

- Summarize chapters
- Find abridged version on the Internet
- Collaborate with ELA general education teacher
- Battle of the books teams, etc.
- Keep literary elements intact

2. Adapt Text

Lexile Framework for Reading

- Put text into Lexile analyzer
  - https://www.lexile.com/analyzer/results/2371673/
  - Free to register
  - Save files as ".txt"

Activity

- Go to bookbuilder.cast.org
- Set up a free account
- Practice making your own eBook
  - Can use made-up text or a summary you find online
  - Can embed an audio file or utilize the text-to-speech built into the website

3. Put it All Together – The Lesson

a) Vocabulary instruction
b) Repeated readings
c) Graphic Organizers
d) Comprehension Questions
e) Writing Component

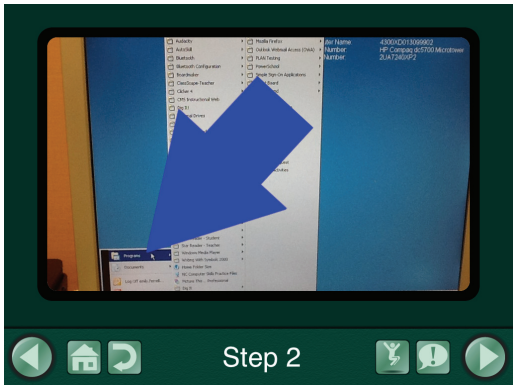
a). Vocabulary Instruction

- Quizlet app / software
- GoTalk NOW app
- SMARTboard app / software
- Educreations app

b). Repeated Readings

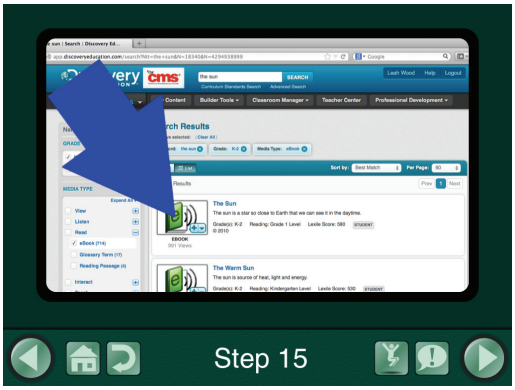
- Consider use of peers for support
- Teach students how to use the technology to access and replay text as needed

Accessing eBooks



Accessing eBooks

Accessing eBooks



c). Graphic Organizer

Technology tools available to teach use of graphic organizers

- Kidspiration app
- SMARTboard app or software
- Readwritethink student interactives

d). Comprehension Questions

Technology available for response options

- GoTalk NOW
- SMARTboard app / software
- Quizlet app/ website

e). Writing Component

Technology to assist in writing

Write about This app

- https://itunes.apple.com/us/app/write-about-this/id601375313?mt=8


Quick Write

- Finish your technology list on your handout, including the "Application" column

Turn and Talk

- Talk to a neighbor about one of your ideas for using technology to teach literacy to students with disabilities

- Overcoming barriers
- Review of SBL with tech supports
- Helpful websites
- Helpful apps
- Anything else?

LUNCH

Afternoon Agenda

1. **Warm-up:** SI / EI activities
2. **Introduction to Mathematics**
3. **Early Numeracy**

BREAK

3. **Schema Base Math Problem Solving**

BREAK

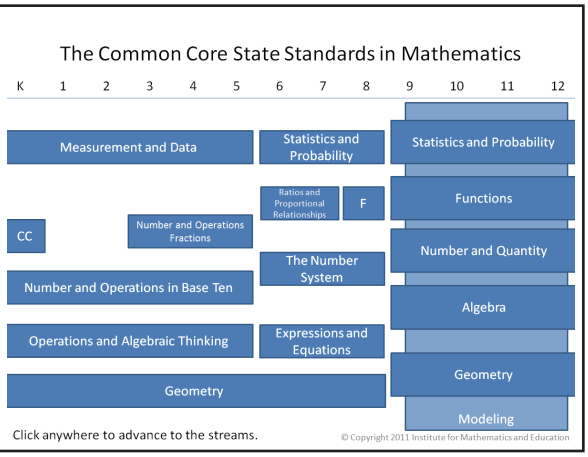
4. **Closing**

1. Warm-Up

- NCSC Wiki and the IR Guide
- Partner practice: Task analytic Instruction
- Partner practice: Example / Non example

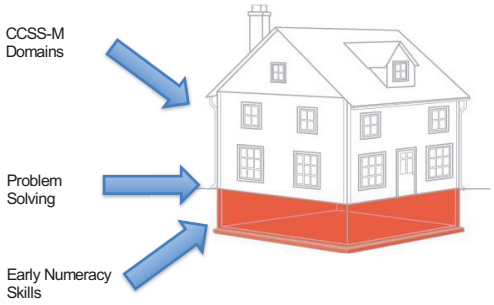
2. Introduction to Mathematics



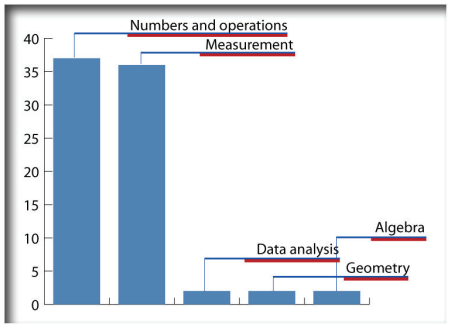



Math Processes / Practices

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning



Mostly Money



Browder, D., Spooner, F., Ahlgrim-Delzell, L., Harris, A., & Wakeman, S. (2008). A meta-analysis on teaching mathematics to students with significant cognitive disabilities. *Exceptional Children*, *74*, 407-432.

Research / Evidence-Based Practices

- **Systematic instruction** is an evidence-based practice for teaching mathematics to students with SCD
- Systematic instruction should include a **specific prompt fading procedure** (e.g., system of least prompts, time delay) with feedback
- Should include **opportunities to learn** and practice these skills **in vivo** (e.g., shopping, job applications)

Early Numeracy

What is Early Numeracy?

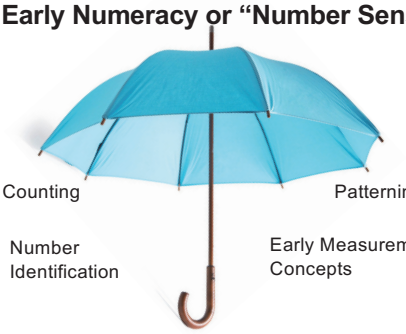
THINK - PAIR

Brainstorm what you think of when you hear "Early Numeracy" – definitions, skills, importance, etc.

SHARE

Tell the whole group what you and your partner discussed

Early Numeracy or "Number Sense"



Rote Counting

Patterning

Number Identification

Early Measurement Concepts

Creating Sets

Counting with 1:1 Correspondence

Composing and Decomposing Numbers

Why are EN skills hard for students with moderate and severe disabilities?

Early Numeracy = Number Sense

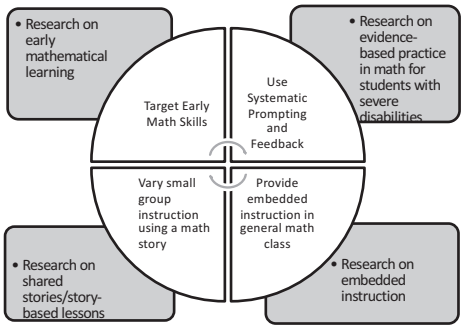
"Individuals ability to understand numbers and operations and use these concepts and strategies ***to make mathematical judgments and for more complex problem solving"***

(McIntosh, Reys, & Reys, 1992)

- Student's early mathematical understanding *strongly* influences later success in mathematics
- Students who struggle in math often lacked opportunities to learn EN skills

What effect could this have as students with severe disabilities progress to later grades without sufficient EN skills?

Conceptual Model of EN



Browder, Jimenez, Spooner et al., 2013

Links to Literacy …

Number Sense is the "Phonics" of Mathematics

Reading

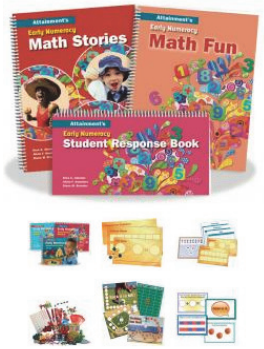
- Independence requires decoding with fluency (phonics)
- Supplement phonics instruction with read-alouds of age appropriate text to build comprehension

Math

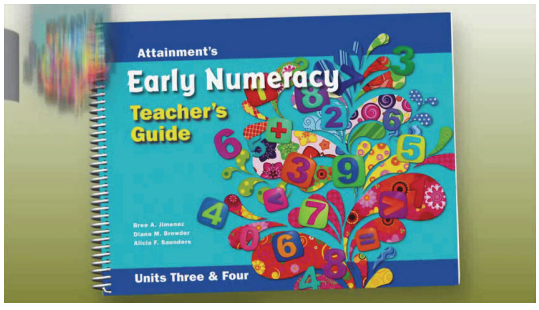
- Independence requires number sense and computation with fluency
- Supplement early numeracy instruction with calculator use to do grade-aligned inclusive mathematics

- The standards include domains and *practices*
- *Practices* are the ultimate goal for ALL students
- *Early numeracy* skills are critical for all students
- We know systematic and explicit instruction is an EBP for teaching math to SWSD
- What else?

3. Teaching Early Numeracy



Early Numeracy Skills



Early Numeracy Skills Builder
Engaging Lessons

- Thematic
- Includes All Objectives for Unit
- Scripted Lessons
- Repeated Trials using Systematic Instruction
  - CTD
  - System of least prompts
- Taught Daily by Special Education Teacher

SCOPE AND SEQUENCE

There are four units of instruction, which address 7 domains, in the Early Numeracy curriculum. The following scope and sequence presents the domains, skills, and themes across the four units of the curriculum.

Domain	UNIT ONE Math Is Everywhere	UNIT TWO Math at Celebrations	UNIT THREE Math in Nature	UNIT FOUR Math + Me = Fun
Counting	1 Count 1–5 movable objects in a line.	1 Count out 1–5 movable objects from a group.	1 Count 1–10 movable objects in a line.	1 Count out 1–10 movable objects from a group.
	2 Count 1–5 nonmovable objects in a line.	2 Count 1–5 scattered, nonmovable objects.	2 Count 1–10 nonmovable objects in a line.	2 Count 1–10 scattered, nonmovable objects.
	3 Rote count from 1–5.	3 Rote count from 1–10.	3 Rote count from 1–15.	3 Rote count from 1–20.
Sets	4 Make sets of 1–3.	4 Make sets of 1–4.	4 Make sets of 1–9.	4 In context, make sets of 1–9.
	5 Add premade sets with sums to 5.	5 Add sets with sums to 5.	5 Add sets with sums to 10.	5 In context, add sets with sums to 10.
Symbol Use	6 Compare sets for same/equal.	6 Compare sets for greater than.	6 Compare sets for less than.	6 Compare sets and numbers for equal, greater than, and less than.
	7 Identify the symbol for equals (=).	7 Identify the symbol for greater than (>).	7 Identify the symbol for less than (<).	7 Use symbols for equals, greater than, and less than (=, >, <).

(Scope and Sequence continues)

(Scope and Sequence continued)

Domain	UNIT ONE Math Is Everywhere	UNIT TWO Math at Celebrations	UNIT THREE Math in Nature	UNIT FOUR Math + Me = Fun
Patterns	8 Identify an ABAB pattern.	8 Extend an ABAB pattern.	8 Create an ABAB pattern.	8 Complete an ABAB pattern with missing components.
Measurement	9 Use a nonstandard unit of measurement to measure 1–5.	9 Use a standard unit of measurement to measure 1–5 inches.	9 Use a standard unit of measurement to measure 1–10 inches.	9 Convert inches to feet.
Calendar	10 Identify dates from 1st to 5th on a calendar.	10 Identify dates from 1st to 10th on a calendar.	10 Name dates from 1st to 5th on a calendar.	10 Name dates from 1st to 10th on a calendar.
	11 Identify 1–5 days later in a week using a calendar.	11 Identify 1–5 days later across 2 weeks using a calendar.	11 Identify 1–10 days later across 2 weeks using a calendar.	11 Identify 1–10 days later across 5 weeks using a calendar.
Numeral Identification	12 Identify numerals 1–5.	12 Identify numerals 1–10.	12 Name numerals 1–5.	12 Name numerals 1–10.

Domain	UNIT ONE Math Is Everywhere
Counting	1 Count 1–5 movable objects in a line.
	2 Count 1–5 nonmovable objects in a line.
	3 Rote count from 1–5.
Sets	4 Make sets of 1–3.
	5 Add premade sets with sums to 5.
Symbol Use	6 Compare sets for same/equal.
	7 Identify the symbol for equals (=).

Domain	UNIT ONE Math Is Everywhere
Patterns	8 Identify an ABAB pattern.
Measurement	9 Use a nonstandard unit of measurement to measure 1–5.
Calendar	10 Identify dates from 1st to 5th on a calendar.
	11 Identify 1–5 days later in a week using a calendar.
Numeral Identification	12 Identify numerals 1–5.

Each Unit has 6 lesson plans (total of 24 lesson plans)

TABLE 2 Lesson Themes

UNIT ONE	Math Is Everywhere
Lesson 1	Math at the Speedway
Lesson 2	Math Treasures
Lesson 3	Gardening with Math
Lesson 4	Beach Math
Lesson 5	Math Class Trip
Lesson 6	Soccer Review
UNIT TWO	Math at Celebrations
Lesson 1	Mardi Gras Math
Lesson 2	Math in the New Year
Lesson 3	Math at the Fiesta
Lesson 4	Math at the Family Feast
Lesson 5	Going to a Pow Wow
Lesson 6	Basketball Review
UNIT THREE	Math in Nature
Lesson 1	Math in the Flower Garden
Lesson 2	Backyard Buggy Math
Lesson 3	Fishing for Numbers
Lesson 4	Math at the Aquarium
Lesson 5	Froggy Math
Lesson 6	Football Review
UNIT FOUR	Math + Me = Fun
Lesson 1	Butterfly Math
Lesson 2	Math at the Ballgame
Lesson 3	Math in the Desert
Lesson 4	Math at the State Fair
Lesson 5	Math in the Berry Patch
Lesson 6	Baseball Review

Lesson Format

- Anticipatory Set
- Rote Counting Warm-up
- Time Delay for Number Recognition
- Math story
- Apply Numeracy Objectives to Story
- Math Fun (student workbook)
- Review Lesson (Lesson 6)
- Assessment (baseline and mastery)

Research-Based Practices for Teaching EN

Systematic Instruction

- Time delay
- System of least prompts

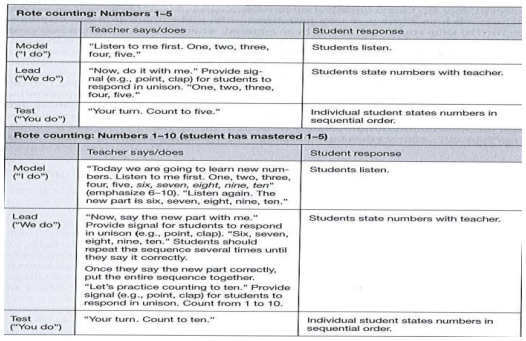
Specific procedures for systematically prompting and reinforcing operationally defined responses

Explicit Instruction

- Model-lead-test procedure
- Multiple exemplars

Teacher provides clear models of answering or solving the problems with multiple examples, students receive ample opportunities to practice, students receive extensive feedback with error correction

Model-lead-test



Rote counting: Numbers 1–5		
	Teacher says/does	Student response
Model ("I do")	"Listen to me first. One, two, three, four, five."	Students listen.
Lead ("We do")	"Now, do it with me." Provide signal (e.g., point, clap) for students to respond in unison. "One, two, three, four, five."	Students state numbers with teacher.
Test ("You do")	"Your turn. Count to five."	Individual student states numbers in sequential order.
Rote counting: Numbers 1–10 (student has mastered 1–5)		
	Teacher says/does	Student response
Model ("I do")	"Today we are going to learn new numbers. Listen to me first. One, two, three, four, five, *six, seven, eight, nine, ten*" (emphasize 6–10). "Listen again. The new part is six, seven, eight, nine, ten."	Students listen.
Lead ("We do")	"Now, say the new part with me." Provide signal for students to respond in unison (e.g., point, clap). "Six, seven, eight, nine, ten." Students should repeat the sequence several times until they say it correctly. Once they say the new part correctly, put the entire sequence together. "Let's practice counting to ten." Provide signal (e.g., point, clap) for students to respond in unison. Count from 1 to 10.	Students state numbers with teacher.
Test ("You do")	"Your turn. Count to ten."	Individual student states numbers in sequential order.

Rote Counting

- Rote count = identify numbers in a sequence
- Break down into manageable increments
  - 1-5, 1-10, 1-15, 1-20, 1-30
- Count forward and backward from a given number
  - AFTER students can count from 1
  - Can use the "get it going" signal for choral responding

1. "I do"	2. "We do"	3. "You do"
Model	*Lead*	*Test*

Number Identification

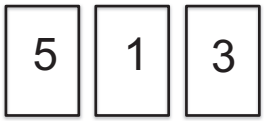
- Association of orthographic symbol to name ***(similar to the alphabetic principal)***
  3 *"three"* 4 *"four"* 5 *"five"*
- Consider expressive and receptive identification
- Gradually vary placement of numbers
  - Number line with targeted numbers
  - Open number line with some numbers missing
  - ID numbers on cards out of order
  - Scatter numbers on a card
- Teach using constant time delay

Number ID Practice

Teaching **receptive** number ID on index cards:

First: 0-s round

Second: 4-s rounds



Instructional Cue :"Touch _____"

Number ID Practice

Teaching **expressive** number ID on index cards:

First: 0-s round

Second: 4-s rounds

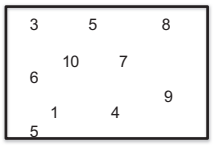
Instructional Cue :"What number?"

Number ID Practice

Teaching receptive and expressive number ID with scattered numbers:

First: 0-s round

Second: 4-s rounds



Receptive Instructional Cue
"Touch _____"

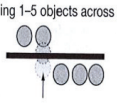
Expressive Instructional Cue
"What number?" ***while touching the targeted number***

One-to-One Correspondence

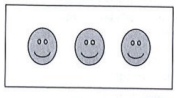
- Coordinated counting with the touching or moving of objects to determine the quantity of a particular set
- Use same progression as rote counting (1-5, 1-10, etc.)
- Students must be taught to visually organize
- If a student is able to name the number of objects in a group without counting them out, the student is ***subitizing***
- Teach ***cardinality*** simultaneously by having students repeat the last number they heard

Teaching Visual Organization

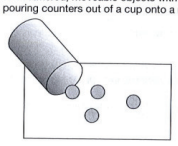
First, teach moving 1–5 objects across a line.



Next, teach scattered, nonmoveable objects in a line, such as an index card with stickers.



Then, teach scattered, moveable objects with no line, such as pouring counters out of a cup onto a mat.



Finally, teach scattered, nonmoveable objects, such as stickers on a card or items on a worksheet.

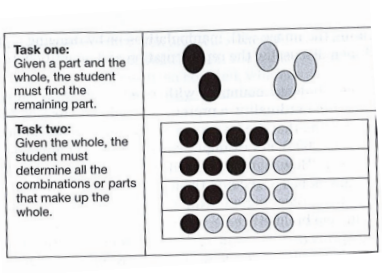
Creating Sets

- Prerequisite skills:
  - Counting with one-to-one correspondence
- May need to teach cardinality simultaneously
  - Teacher: "Make a set of 3. How many?"
  - Student: "3 and stop" while signing stop; counts out 3.
  - If student goes too far, teacher may say and sign "3 and stop."
  - Other supports: writing numeral requested
- Teach with MLT *and* SLP

Comparing Quantities

- Teaching sequence: same, more, less
- More, less, and same can be translated to greater than (or more than enough), less than (not enough) , and equal to (or enough)
- Explicit instruction using multiple exemplars is a good strategy for teaching this concept

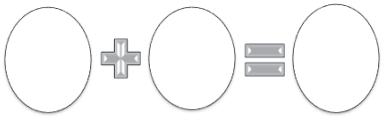
Composing and Decomposing Numbers



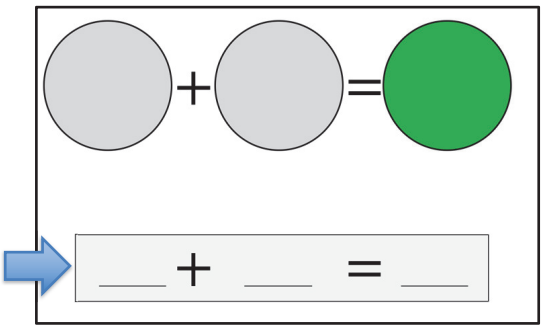
Saunders et al., 2014

Working Towards Addition

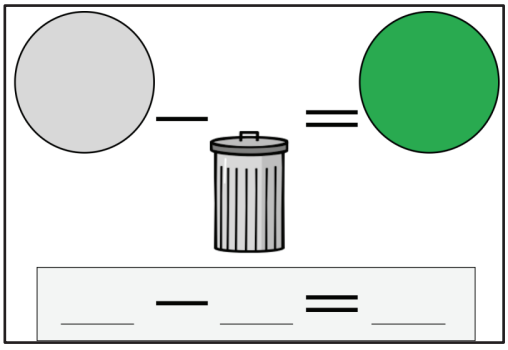
- Teach in small increments
- Begin with adding sets using manipulatives and graphic organizer
- Provide premade sets first, then have students make their own sets once they master first skill
- Teach step-by-step then fade support



Addition



Decomposing numbers GO



Patterns

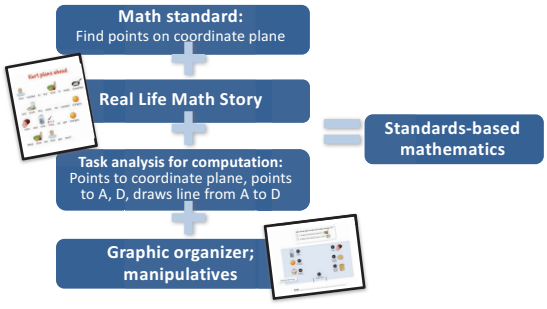
- Patterns help to build algebraic thinking and reasoning
- First students are taught patterns with physical objects, then numbers
  - Always say the pattern aloud for the student to help them predict and extend

- Skip counting is included in patterning
  - 5s, 10s, 2s
- Explicit Instruction with visual supports (hundreds charts) can help to teach skip counting but should be faded

Build Generalization

- Vary numbers and manipulatives
  - Alternate between virtual and concrete
- Embed in natural activities throughout school day
- Inform parents of the skills you are working on with each child
- Embed opportunities to practice skills in grade-aligned mathematics lessons
- Practice skills with different teachers and in different settings
- Peer tutors

Standards-Based Math Lesson



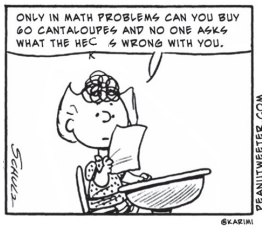
Browder (2015)

- Early Numeracy is story-based
- Early Numeracy embeds systematic instruction (CTD & SLP) with explicit instruction (MLT and examples/non examples)
- Early Numeracy lessons incorporate several early numeracy skills
- What else?

5 min

4. Schema-based Math Problem Solving

We DON'T need…



Goal of Teaching Problem Solving

- Increased number of opportunities that students may have never had before
- Increased independence as well as employability advantages
- Increased ability to apply mathematical skills to everyday life

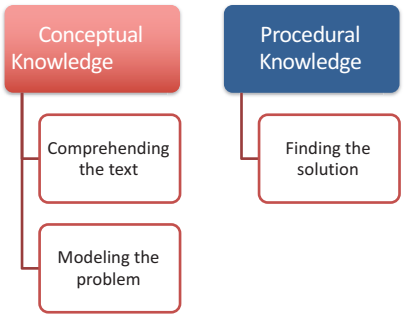
Why is problem solving so difficult for students with disabilities?

- Linguistic Difficulties
  - Length of problem
  - Sentence structure and complexity
  - Vocabulary
  - Order key information appears in problem
  - Reliance on reading comprehension
- Executive Functioning Demands
  - Planning
  - Organizing
  - Deciding on strategies to use
  - Putting information from problem in working memory
  - Retaining strategies for solving

The Solutions Project: Key Elements

- Schema-Based Instruction:
  - Explicitly teaches students to sort problems into categories based on mathematical structures
  - Students are taught rules for solving each problem type
- Evidence-based Practices for Teaching Math to SSD
  - Task analytic instruction
  - Least intrusive prompting
- Contextual Math
  - Math is anchored through multi-media or shared stories to provide context and engagement

Successful Problem Solvers Combine:



SBI vs. Modified SBI

Visual diagrams to show relationships between quantities in problem	More detailed graphic organizers with visual supports
Use of a heuristic (mnemonic) to teach problem solving process	Replace mnemonic with step-by-step task analysis for problem solving
Use explicit instruction to teach heuristic and problem solving process	Use explicit instruction + systematic instruction
Metacognitive strategy instruction	Rules taught with hand motions, self-monitoring checklist

How to give math context

- Choose a theme for word problems that is **high interest** and **relevant**
  - Scenarios student would encounter in future or current environments
  - Incorporate preferences
- Anchor the lesson for **comprehension** and **engagement**
  - Pictures
  - Videos
  - Objects
  - Movement

Don't lose focus of instruction!

Guidelines for Writing Word Problems:

Avoid reliance on key words

- In SBI students learn to focus on underlying schema relation or problem structure before solving the problem
- Focus should be on teaching students to differentiate between problem types
- Keywords can be a part of SBI but do not always reflect problem types

Guidelines for Writing Word Problems:
Avoid reliance on key words

Keywords can be a part of SBI but do not always reflect problem types

John has 5 math work folders to do. He has 3 reading work folders to do. How many **more** math folders than reading folders does he have to do? — **Compare**

John has 4 work folders. He has done 2 work folders. How many **more** work folders does he have to do? — **Change**

John has 3 work folders. Mary has 1 **more** than John. How many do they have altogether? — **Group**

Guidelines for Writing Word Problems:
Word Choice

- Keep sentences the same length and use words which are easy to decode
- Use a *variety* of nouns ("things") which are
  - Familiar
  - Concrete
  - Relate to the theme
  - Make sense

Guidelines for Writing Word Problems:
Names

- Choose names that will increase engagement
  - Students within classroom
  - Familiar people (family, people around school)
  - Reflection of interest (celebrities, athletes, etc.)

Guidelines for Writing Word Problems:

Verbs

- Used verbs that clearly indicate action

Addition Verbs	Subtraction Verbs	General Verbs
make	take away	give
combine	lose	eat
put together/more	pop	share
pick	break	plant
find	smash	count
pick up	spill	grow
add	crack	
collect	pay	
gather		
buy		

Guidelines for Writing Word Problems:

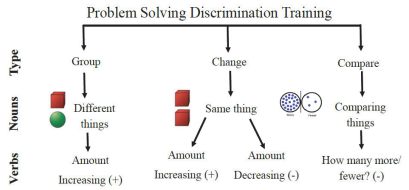
Numbers

- Intentionally choose numbers based on student ability
  - Easiest to represent as numerals
  - Zero or "none" is a difficult concept
  - Sums of less than 10 for making sets
  - Consider calculator use for numbers >10
  - Alternate between putting smaller or larger number first in addition problems

Other considerations:

- Order the information in the problem in the order students will need to solve (a + b = c)
- When first teaching, target missing ending solution only (a + b = c)
- Rather than paragraph form, use separate sentences
- Avoid including extraneous numbers or information

How Problem Types Vary



Guidelines for Writing Word Problems

3 Problem Types for Addition and Subtraction

- ***Group*** problems combine two distinct things (parts) into one large group (whole)
- ***Change*** problems involve one thing which either increases (change-add) or decreases(change-subtract) in value
- ***Compare*** problems involve two people/objects comparing amounts of one thing or one person/object comparing amounts of two things

Group Problem Examples
Theme: School Basketball Game

Formula	Examples	
Anchor sentence	Aaron and Jose bought snacks at the school basketball game.	There are cheerleaders at the school basketball game.
# thing 1	Aaron bought 2 buckets of popcorn.	There are 2 boys on the cheerleading team.
# thing 2	Jose bought 1 hotdog.	There are 4 girls on the cheerleading team.
Question with label	How many snacks did they buy in all?	How many cheerleaders are on the team?

Group problems have two different nouns with something in common.

Beth went on a class trip to the zoo.

Beth saw 7 lions.

Beth saw 2 polar bears.

How many animals Beth see altogether?

There are many types of birds at the beach.

Ava saw ___ seagulls at the beach.

Ava saw ___ pelicans at the beach.

How many birds did Ava see at the beach?

There is a team of cheerleaders at the school basketball game.

There are 2 male cheerleaders on the team.

There are 8 female cheerleaders on the team.

How many cheerleaders are on the team?

Change Problem Examples Theme: School Basketball Game

Formula	Examples	
Anchor sentence	Aaron saved his money to go to the school basketball game.	Jose likes to eat sour straws at the basketball game.
1 Thing & beginning state (#)	Aaron had $5 to spend at the basketball game.	Jose had 8 sour straws.
Increase or decrease verb + increase or decrease amount	Aaron's mom gave him $3 more to spend at the basketball game.	Jose ate 3 sour straws.
Question with label	How much money does Aaron have now?	How many sour straws does Jose have left?

Change problems discuss one noun.

Abby bought lemonade at the school dance.

She bought ___ lemonades.

Then she bought ___ more lemonades for friends.

How many lemonades did Abby buy?

Jose bought sodas for friends at the basketball game.

Jose bought ____ sodas.

Then he spilled ____ sodas.

How many sodas does Jose have now?

Sheep are supposed to stay in the pen at the farm.

There were ___ sheep in the pen.

___ sheep got out of the pen.

How many sheep are left in the pen?

Emily brings customers drinks on a tray.

Emily had 5 drinks on her tray.

She spilled 2 drinks.

How many drinks are left on Emily's tray?

Aiden took some dollars to buy snacks at the grocery store.

Aiden took $8 dollars to the grocery store.

Aiden paid $2 dollars for bag of chips.

How many dollars does Aiden have left?

Compare Problem Examples Theme: School Basketball Game

Formula	Examples	
Anchor Sentence	Aaron and Jose both like to go to basketball games.	Jose sees many coaches at the game.
Person/Thing 1 #	Aaron has been to 5 games.	Jose sees 4 female coaches.
Person/Thing 2 #	Jose has been to 2 games.	Jose sees 2 male coaches.
Question with label	How many more games has Aaron been to than Jose?	How many fewer coaches are male than female?

Ben and Kim went to the book fair at school.

Kim bought 6 books.

Ben bought 4 books

How many more books did Kim buy than Ben?

Caleb saw many different bears at the zoo.

Caleb saw ___ brown bears.

Caleb saw ___ polar bears.

How many fewer polar bears than brown bears did he see?

Mia compared rainy days in September and October.

September had 10 rainy days.

October had 8 rainy days.

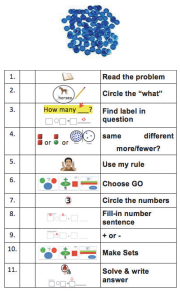
How many fewer rainy days did October have than September?

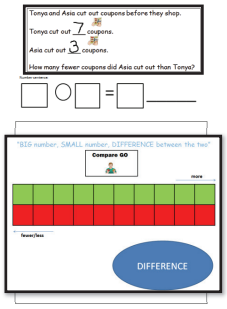
Let's Practice

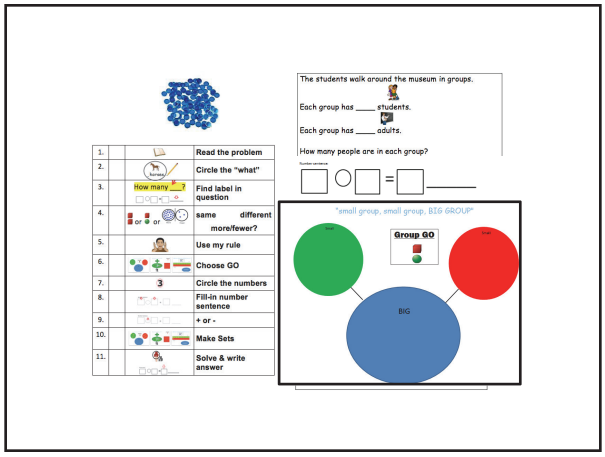
- Thinking of students in your classroom, write 1-2 group, change, and compare word problems using the template.

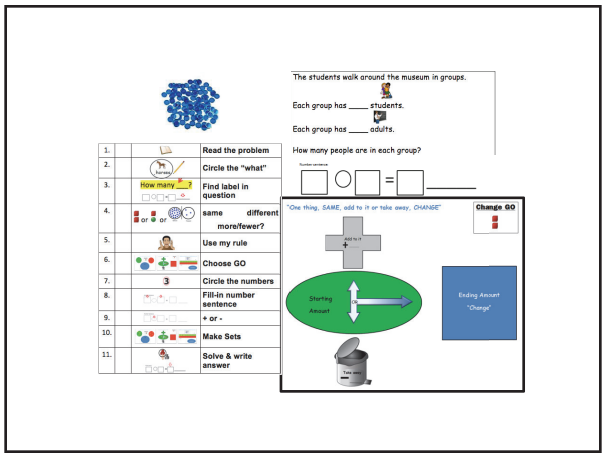
Graphic Organizers with Visual Supports

- Visually represent problem type and relationship between quantities
- Purpose is to help students organize information from the problem
- Need space to use manipulatives (rather than writing in numbers)
- Color-coding and visual supports



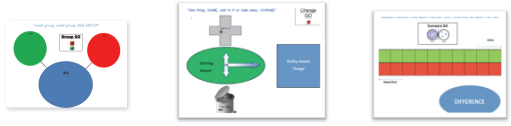






Rules for Each Problem Type

- 3 "Rules" with hand motions to remember problem types
  - Group: **"small group, small group, BIG group"**
  - Change: **"one thing, same, add to it or take away, change"**
  - Compare: **"bigger number, smaller number, difference between the two"**



Combining Sets

- Combines multiple EN skills
- Can be embedded within problem solving
- Taught using MLT and SLP

Teach Using Explicit Instruction & Systematic Instruction

Model first

5.			**Use my rule**

Step 5: Point to step 5 on student self-instruction sheet. **Step 5 says "use my rule." This is a very important step. We have to decide what is happening in our problem.** Pause.

(emphasize capitalized words) **This is a GROUP problem because it has two small groups** (make O's with hands) **of DIFFERENT things** (sign "different") **that we combine to make one BIG group** (make big O). **In this problem we have two small groups of different things- (noun 1) and (noun 2), and we combine them to make one BIG group- (label from question). Small group, small group, BIG group.** Make small "o" with left hand and say, **(noun 1)**, make small "o" with right hand and say, **(noun 2)**, as you bring fingers together to make big "O" say, **and we combine them to a BIG group of (label).**

****Remember to always use behavior specific praise****

Teach Using Explicit Instruction & Systematic Instruction

Lead next

Demonstrate rule using model, lead, test. The first time state rule, and the second time insert the two whats and the label.

1. **Watch me *use my rule* again, "small group, small group, BIG group…[noun 1; e.g., popcorn], [noun 2; hot dog], [label; snacks]."**
2. **Do the rule with me, "small group, small group, BIG group…popcorn, hot dog, snacks."**
3. Call on each student and have them practice. **Your turn. Use the rule.**

- For error correction, provide the model again and retest. Keep practicing until student can do on his/her own.
- For nonverbal/students with limited verbal skills, have them mouth words and make hand motions, then point to two whats and label.

Check off "use my rule" on the checklist. Place a check beside "5." on the student self-instruction sheet.

****Remember to always use behavior specific praise****

Teach Using Explicit Instruction
& Systematic Instruction

Teach last with step

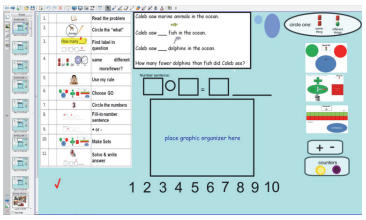
Step 5: Use my Rule			
independent response	Least Intrusive Prompts		
↓	Verbal →	Specific Verbal →	Model/Incorrect
You got it! Small group, small group, BG group_(noun 1), (noun 2), (label).	Step 5 says use my rule	This is a group problem because the wholes and the label (point to them in problem) are ALL different. In group problems, we combine 2 small groups to make 1 big group. Can you show me with your hands using the words from the problem? Wait for student to respond.	Model-retect. Model the hand motion with rule and repeat with two nouns and label from problem. Wait for student to repeat. Provide physical guidance if needed and break into chunks.

Remember to always use behavior specific praise

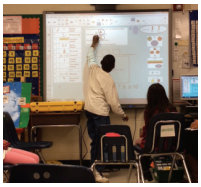
Plan for Generalization

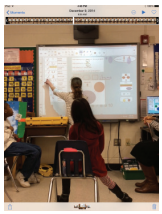
1. Technology (SMART Board and iPad)
2. Real-World Problems Presented in Video Format
3. Across Standards
4. Across People & Settings (e.g., with peers and/or in gen ed setting)

SMARTBoard

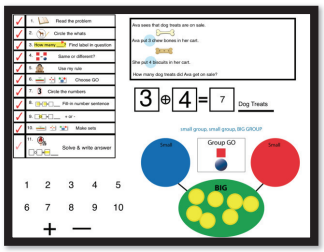


Problem Solving- Technology (SMARTBoard)





Problem Solving- Technology (iPad)



Practice Schema-Based Math Problem Solving

- Review SBMBS handouts
- Practice teaching the task analysis to a partner using one of the question you wrote previously
- Remember, MLT with SBL